

Environmental Health Considerations of Point Source Carbon Capture

Workshop on Measurement, Monitoring and Controlling
Potential Environmental Impacts from the Installation of
Point Source Capture

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About PSE

PSE Healthy Energy (PSE) is a nonprofit energy science and policy research institute. Our mission is to generate science-based energy and climate solutions that protect public health and the environment.

- We apply rigorous scientific methods to policy-relevant research questions.
- We bring multidisciplinary expertise, including engineering, environmental science and public health.
- We connect diverse audiences with actionable scientific data.

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Road Map

- Carbon capture in the context of climate goals
- Carbon capture in the context of public health
- Environmental health data and research needs
- Select elements for further consideration

Climate context of point source carbon capture: global implications

- Well-established increasing infrequency, intensity and compounding nature of impacts associated with climate change.
- Even with aggressive decarbonization scenarios, carbon capture and carbon dioxide removal are required to meet climate goals.
- Select, hard-to-abate/decarbonize industries with centralized point sources offer opportunities for strategic deployment of carbon capture technologies.

Health context of point source carbon capture: local, regional implications

- **Place matters**

- Particularly in the context of air quality and facility emissions to air

- **Proximity of nearby populations**

- **Characterizing cumulative burden of nearby communities**

- Demographics and population characteristics
- Pollution burden
- Health vulnerabilities
- Existing/projected climate risks

Environmental health data and research needs

Comprehensive picture of on-site air pollutant emissions

- **Air pollutants:** Criteria air pollutants, hazardous air pollutants (speciated VOCs), additional air pollutants identified as associated with particular capture substrates / technological approaches and chemical transformation byproducts
- **Measurement and monitoring:** Utilizing standard analytical methods, health-relevant limits of detection, and measurements with temporal resolution to assess appropriate durations of exposure
- **Emissions characterization:** Emissions factors for various emissions types/activities, including those beyond normal operations (construction, ancillary equipment, off normal events, equipment failures)
- **Exploring wide range of carbon capture technologies and sector applications**

Environmental health data and research needs

Waste & byproduct management

- Characterization of waste byproducts following pretreatment or capture phases
- Characterization of captured CO₂ stream
- Quality determined by relevant local, state, federal standards based on intended disposal method or utilization approach

Safety, risk management, emergency response

- CO₂ transport and storage (on and off site)
- Incorporation of additional technologies, equipment into risk management plans and emergency response protocols
- Unintentional loss of containment events (CO₂, other releases)

Environmental health data and research needs

Additional quantitative analyses and assessments

- Scaling considerations
- Exploration and efficacy of mitigation measures
- Enhanced energy demand requirements and associated emissions
- Modeling primary air pollutant emissions and secondary pollutant formation
- Life cycle and alternatives assessment
- Co-benefits

Key Elements for Further Consideration

- **Data disclosures** of system inputs and anticipated outputs can inform thorough hazard characterization efforts; can inform prioritization of health-relevant compounds for additional monitoring/modeling
- **Development and required reporting of emissions factors** for various emission types are needed for criteria and hazardous air pollutants
- **Data collection efforts designed with varied public health applications in mind**, including measurements that allow for comparison to available health-based guidance values, evaluation of various health endpoints and exposure durations
- **Consideration of baseline community characteristics** from the perspective of cumulative burden, as well as projected risks
- **Community input and perspectives** needed to identify key community concerns and inform research questions and data collection efforts
- **Field-based and modeling studies** needed to understand the risks and impacts of individual applications on air quality and human health
- **Clear synthesis and communication strategies** needed to share findings with diverse audiences

Thank you. Questions?

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